

IN THE CLAIMS:

1 - 38 (Canceled)

39. (New) A beam control system comprising:

first means for detecting aberration in a first beam of electromagnetic energy without amplification thereof and providing an error signal in response thereto;

second means responsive to said error signal for providing a conjugate correction signal;

third means responsive to said conjugate correction signal for providing a predistorted reference beam;

fourth means including an amplifier for amplifying said predistorted reference beam to provide an amplifier distorted reference beam; and

fifth means for conjugating said amplifier distorted reference beam to provide said correction signal to said amplifier whereby amplifier provides an output beam predistorted to correct for said aberration in said first beam.

40. (New) The invention of Claim 39 wherein said first beam is a return beam comprising a reflection of a beam.

41. (New) The invention of Claim 40 wherein said first means includes a target wavefront sensor.

42. (New) The invention of Claim 41 wherein said first means includes a telescope in alignment with said target wavefront sensor.

43. (New) The invention of Claim 42 wherein said first means includes an aperture sharing element between said telescope and said target wavefront sensor.

44. (New) The invention of Claim 43 wherein said first means further includes an optical phased array disposed between said aperture sharing element and said target wavefront sensor.

45. (New) The invention of Claim 43 further including means for correcting for noncommon path errors in said aperture sharing element.

46. (New) The invention of Claim 45 wherein said means for correcting for noncommon path errors in said aperture sharing element includes a pseudo-conjugator adapted to sample said beam output by said amplifier via said aperture sharing element.

47. (New) The invention of Claim 46 wherein said means for correcting for noncommon path errors in said aperture sharing element further includes a local loop wavefront sensor adapted to receive a beam retro-reflected by said pseudo-conjugator and provide an error signal in response thereto.

48. (New) The invention of Claim 45 wherein said means for correcting for noncommon path errors in said aperture sharing element includes a Grating Rhomb adapted to sample said beam output by said amplifier.

49. (New) The invention of Claim 48 wherein said means for correcting for noncommon path errors in said aperture sharing element further includes a second wavefront error sensor for detecting aberration in said output beam.

50. (New) The invention of Claim 49 wherein said means for correcting for noncommon path errors in said aperture sharing element further includes a third wavefront error sensor for detecting aberration in said output beam due to said aperture sharing element.

51. (New) The invention of Claim 43 wherein said aperture sharing element is an output coupler or outcoupler.

52. (New) The invention of Claim 51 further including means for sensing aberrations in said predistorted reference beam due to said aperture sharing element.

53. (New) The invention of Claim 39 wherein said second means includes an adaptive optics processor.

54. (New) The invention of Claim 39 wherein said third means includes a master oscillator and an optical phased array.

55. (New) The invention of Claim 39 wherein said fifth means includes a phase conjugate mirror.

56. (New) The invention of Claim 55 wherein said second means includes a second phase conjugate mirror.

57. (New) A method for controlling a beam including the steps of:  
detecting aberration in a first beam of electromagnetic energy without amplification thereof and providing an error signal in response thereto;  
providing a conjugate correction signal in response to said error signal;  
providing a predistorted reference beam in response to said conjugate correction signal;  
amplifying said predistorted reference beam to provide an amplifier distorted reference beam; and  
conjugating said amplifier distorted reference beam to provide said correction signal to said amplifier whereby amplifier provides an output beam predistorted to correct for said aberration in said first beam.